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the starting-point of the investigations which led up to the thermal theories of J.R. Mayer, Krönig, Clausius, and others, and in view of the frequent references to them in books on the history of the conservation of energy, it is well that they can be obtained in a separate and cheap form.

Lambert's researches are the first general investigations on cartography and form collaterally valuable contributions to pure mathematics. The thread of investigation in this field was continued by Lagrange, who, while still generalising the methods of treatment, aimed, as was always his wont, at obtaining practically useful results. With Gauss, emphasis was principally laid upon the abstract mathematical point of view.

The publication of this series is a valuable work, and all students should possess the Classics which relate to their departments. μ.

Elements of Theoretical Physics. By *Dr. C. Christiansen*, Professor of Physics in the University of Copenhagen. Translated into English by *W. F. Magie, Ph. D.*, Professor of Physics in Princeton University. London and New York: The Macmillan Co. 1897. Pages, 339. Price, $3.25.

Of the flood of recent text-books on physics the treatise of Professor Christiansen has stood high in pedagogical favor. It exists at least in a German translation and has now been Englished by Prof. W. F. Magie of Princeton University. The book is not an elementary one, and requires considerable knowledge of mathematics, but it is condensed and treats the main problems of theoretical physics in a concise and direct manner. There are fourteen chapters in all, entitled as follows: "General Theory of Motion," "The Theory of Elasticity," "Equilibrium of Fluids," "Motion of Fluids," "Internal Friction," "Capillarity," "Electrostatics," "Magnetism," "Electro-Magnetism," "Induction," "Electrical Oscillations," "Refraction of Light in Isotropic and Transparent Bodies," "Thermodynamics," and "Conduction of Heat." American text-books of physics, having a different purpose in view, devote the greater part of their space to the discussion of methods and instruments, so that a treatise like Christiansen's which is almost totally abstract and mathematical will find the field virtually unoccupied. The translation is good, and the publishers are to be congratulated upon the excellent mechanical makeup of the book. μκρκ.

Ueber den Urstoff und seine Energie. I. Theil. Eine physikalish-chemische Untersuchung über die theoretische Bedeutung der Gesetze von Dulong-Petit und Kopp auf der Grundlage einer kinetischen Theorie des festen Aggregatzustandes. Von *Dr. Phil. H. Keller*. Leipsic: B. G. Teubner. 1896. Pages, 58. Price, M. 2.

The problem of the *prima materia* has occupied philosophical brains for more than two thousand years, and after having been laid to rest by modern philosophical criticism as the vision of a metaphysical dream, has now again come to the fore through the researches of physical chemistry. Both Meyer and Ostwald have expressed their presentiment as to its existence, and the latter has said that if the properties of elements are found to be functions of atomic weights, we are impelled to seek in the latter the cause of the former, and so the notion of a homogeneous primitive matter whose different agglomerated states make up the differences of the elements is readily suggested. He admits that the hypotheses underlying this suggestion are not perfectly established, but the whole corresponds to the present endeavor of science to derive all differences from a fundamental underlying unity. The same problem has occupied Dr. Keller, but where Ostwald has approached it from considerations touching the causes of the periodic law, and from Prout's hypothesis, Dr. Keller has emphasised a different factor which he believes has never been cited in support of a probable existence of a homogeneous primitive matter, namely, the law of Dulong and Petit. It is beyond our purpose here to refer to more than the philosophical trend of Dr. Keller's little paper. The treatment is mathematical and will appeal to specialists only. The author is inclined to the opinion that the universal ether and primitive matter are the same, the universal ether being uncondensed primitive matter and constituting the bond which links the earth to the sun, etc. μκρκ.

THE PHASE RULE. By *Wilder D. Bancroft.* Large 8vo, viii+255 pages. The Journal of Physical Chemistry: Ithaca, New York. Price, $3.00.

In the last ten years great advances have been made in that part of science which applies physical methods to the elucidation of chemical problems. While the most brilliant achievements cluster about the "Theory of Solutions," the "Dissociation Hypothesis," and the molecular structure of liquids, important results have been obtained by the use of Gibb's Phase Rule and Le Chatelier's Theorem.

By a "phase" is meant a portion of matter that is chemically as well as physically homogeneous, and the Phase Rule states that the maximum number of phases possible in any given system is two more than the number of components, a component being defined as a substance of independently variable concentration. The Phase Rule having reference only to states of equilibrium, in case any alteration in a system supervenes and we want to know its direction, we have recourse to Le Chatelier's Theorem, which says that changes in the factors of equilibrium (temperature, pressure) due to external influences bring about reverse changes within the system.

The book before us is an attempt to treat the subject of qualitative equilibrium by the application of the Phase Rule and Le Chatelier's Theorem. Mathematical developments are excluded, probably with a view towards rendering the work the more acceptable to general chemists, most of whom have but a meagre mathematical equipment; graphical representations are, however, used in profusion.

After defining terms in the first chapter, the author passes to the consideration of systems made up of one component and hence presenting in maximo three